## **Claims**

l	1. A dual gate oxide high-voltage semiconductor device, comprising:
2	a buried oxide layer formed over a semiconductor substrate;
3	a silicon layer formed over the buried oxide layer;
4	a top oxide layer formed over the silicon layer;
5	a first gate oxide formed over the silicon layer adjacent the top oxide
6	layer; and
7	a second gate oxide formed over a portion of the first gate oxide.
7	2. The device of claim 1, wherein the silicon layer comprises a source region, a
	3. The device of claim 2, wherein the first gate oxide is formed over the drift
1	region, the body region, and the source region.  4. The device of claim 2, wherein the second gate oxide is formed over the first
2	gate oxide between the top oxide layer and the body region.
1 ·	5. The device of claim 1, further comprising a field plate formed over the top
2	oxide layer, the first gate oxide, and the second gate oxide.

- 6. The device of claim 1, wherein the first gate oxide has a thickness in a range of approximately 300-600A, and wherein the second gate oxide has a thickness in a range of approximately 900-1200A.
- 7. The device of claim 1, wherein the first gate oxide has a length of approximately 3-4 $\mu$ m, and wherein the second gate oxide has a length of approximately 1-2 $\mu$ m.

1	8. A dual gate oxide high-voltage semiconductor device, comprising:
2	a buried oxide layer formed over a semiconductor substrate;
3	a silicon layer formed over the buried oxide layer, wherein the silicon
4	layer comprises a source region, a body region, and a drift region;
5	a top oxide layer formed over the silicon layer;
6	a first gate oxide formed over the silicon layer adjacent the top oxide
7	layer; and
8 ===	a second gate oxide formed over a portion of the first gate oxide between
9	the top oxide layer and the body region.
1	9. The device of claim 8, further comprising a field plate formed over the top
1	oxide layer, the first gate oxide and the second gate oxide.
1	10. The device of claim 8, wherein the first gate oxide has a thickness in a range
2	of approximately 300-600A, and wherein the second gate oxide has a thickness in
3	a range of approximately 900-1200A.
1	11. The device of claim 8, wherein the first gate oxide has a length of
2	approximately 3-4 µm, and wherein the second gate oxide has a length of
3	approximately 1-2μm.

12. The device of claim 8, wherein a thickness of approximately 1200A for the
second gate oxide results in an increase from approximately 1e <sup>12</sup> cm <sup>-2</sup> to
approximately 2e <sup>12</sup> cm <sup>-2</sup> for a maximum allowable charge, and wherein a decrease
of approximately 30% for a specific-on-resistance, of the device.

1	13. A method for forming a dual gate oxide high-voltage semiconductor device,
2	comprising:
3	forming a buried oxide layer over a semiconductor substrate;
4	forming a silicon layer over the buried oxide layer;
5	forming a top oxide layer over the silicon layer;
6	forming a first gate oxide adjacent the top oxide layer over the silicon
7	layer; and
1 2 3 4 5 5 5 5 5 5 5 5 6 7 7 7 7 7 7 7 7 7 7 7	forming a second gate oxide over the first gate oxide.
1	14. The method of claim 13, wherein forming the first gate oxide, and forming the
2	second gate oxide comprises:
3 ===	growing the first gate oxide adjacent the top oxide layer over the silicon
4 14	layer;
5 <b>—</b>	applying a mask over the first gate oxide; and
6	growing the second gate oxide over a portion of the first gate oxide.
1	15. The method of claim 13, wherein forming the silicon layer comprises forming
2	a silicon layer having a source region, a body region, and a drift region over the
3	buried oxide layer.

1	16. The method of claim 15, wherein forming the first gate oxide comprises
2	forming a first gate oxide over the drift region, the body region, and the source
3	region.
1	17. The method of claim 15, wherein forming the second gate oxide comprises
2	forming a second gate oxide over the first gate oxide between the top oxide layer
3	and the body region.
1	18. The method of claim 13, further comprising:
2 🚍	increasing a maximum allowable charge of the device from
3 UT	approximately $1e^{12}cm^{-2}$ to approximately $2e^{12}cm^{-2}$ ; and
2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	decreasing a specific-on-resistance of the device by approximately 30%.
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1 4	19. The method of claim 13, wherein forming the first gate oxide and forming the
2	second gate oxide comprises:
3	forming a first gate oxide having a thickness in a range of approximately
4	300-600A adjacent the top oxide layer over the silicon layer; and
5	forming a second gate oxide having a thickness in a range of
6	approximately 900-1200A over the first gate oxide.
1	20. The method of claim 13, further comprising forming a field plate over the top
2	oxide layer, the first gate oxide, and the second gate oxide.